

**IN THE CLAIMS:**

1. (Original) An implantable cardiac pacing system capable of delivering atrial pace signals at a determined pacing rate and synchronously generating ventricular pace signals at a determined AV delay following delivery of atrial pacing signals and including an AV delay optimizing subsystem, said AV delay optimizing subsystem comprising:

test means for initiating a test to determine an optimal AV delay corresponding to a pacing rate at about a lower rate limit (LRL);

rate means for setting a cardiac pacing rate at or near the LRL;

AV delay means for varying a AV delay interval value to each one of a plurality of respective AV values and for maintaining the AV delay interval value at each said respective AV value for a time t;

QT means operative during the time t of each maintained AV delay value for measuring variation of QT over said time t and for determining a QT differential (QTD) over said time t; and

optimizing means for determining the optimal AV delay, wherein said optimal AV delay corresponds to a minimal QTD, and for programming said optimal AV delay as an operating AV delay.

2. (Original) A system according to claim 1, wherein said QT means comprises means for determining QT<sub>max</sub> and QT<sub>min</sub> during each said time t and means for determining the difference between QT<sub>max</sub> and QT<sub>min</sub> to provide said QTD.

3. (Original) A system according to claim 1, comprising timing means for setting said time t to a predetermined value less than about 10 seconds.

4. (Original) A system according to claim 1, comprising timing means for setting said time to a predetermined number of discrete cardiac cycles.

5. (Original) A system according to claim 1, wherein said AV delay means comprises increment means for setting said AV delay values to a predetermined low value (AVmin) plus an integer (n) multiplied by a difference in time ( $\Delta T$ ), and program means for programming operating values of AVmin, n and  $\Delta T$ .
6. (Original) A system according to claim 1, wherein said AV means comprises program means for automatically cycling through each of said plurality of respective AV values.
7. (Original) A system according to claim 1, comprising evaluation means for evaluating the minimal value of QTD and for changing the AV delay to the value corresponding said minimal value if said minimal value differs significantly from QTD of the AV value prior to initiating said test.
8. (Original) A system according to claim 1, wherein said test means comprises storage means for a storing test criteria and monitoring means for determining that said test criteria are met before initiating a said test.
9. (Original) A system according to claim 8, wherein said storage means stores criteria for a pacing mode and a QT stability value.
10. (Original) A system according to claim 1, comprising AV(r) means for generating an AV(r) curve based on said optimized AV delay.
11. (Original) An implantable pacing system for pacing a patient's heart, having means for generating and delivering atrial pace signals at a determined pacing rate and means for generating ventricular pulses at a determined AV delay following an atrial pace event, and including an AV optimizing subsystem, said AV optimizing subsystem comprising:

test means for initiating a test to determine an optimal AV delay corresponding to a pacing rate near a lower rate limit (LRL);

rate means for setting pacing rate near the LRL;

AV delay means for providing a set of respective base values of the AV delay;

setting means for setting a base value of each of the set of respective base values of the AV delay to each respective one of said set of base values and maintaining said base value for a predetermined duration, the test comprising a duration for each of the set of base values;

modulation means for modulating discrete delay intervals to a plurality of test AV delay values, wherein said plurality of test AV delay values are near each of the set of base values during each said duration;

QT variation means operative during each said duration for determining a change in QT (dQT) during the performance of the modulating function by the modulation means for each of the set of base values;

minimum means for determining the minimum dQT from a set of dQT values derived from the set of base values; and

optimizing means for setting an optimal AV to the base AV value corresponding to said minimum dQT.

12. (Original) A system according to claim 11, wherein said modulation means comprises a programmable apparatus.

13. (Original) A system according to claim 12, wherein said modulation means comprises means for incrementally increasing and decreasing a test AV delay with respect to each of the set of the base values during each duration.

14. (Original) A system according to claim 12, wherein said modulation means comprises means for increasing AV delay in n predetermined discrete steps and for decreasing AV delay in n predetermined discrete steps, whereby the AV delay

is increased and decreased with respect to the base AV delay during each said duration.

15. (Previously Presented) A system according to claim 14, wherein said modulation means comprises a programmable storage structure for holding the value of n and the value of said discrete steps, and n=1.
16. (Original) A system according to claim 15, where n equals at least 2.
17. (Original) A system according to claim 11, wherein said AV means comprises a set of m programmable base values.
18. (Original) A system according to claim 17, wherein said optimizing means comprises means for determining when said minimum dQT is significantly different from a prior dQT determined prior to said test, and for not altering a prior operating AV delay when the optimized AV delay is not significantly different from the prior operating AV delay.
19. (Original) A system according to claim 18, comprising means for automatically repeating said test within a predetermined time following a determination that said minimum dQT is not significantly different.
20. (Original) A system according to claim 11, further comprising program means for programming said test to be completed in less than about ten minutes.
21. (Original) A system according to claim 11, comprising program means for programming each duration to be completed in less than about 10 cardiac cycles.
22. (Original) A system according to claim 11, comprising AV(r) means for generating an AV(r) curve that includes said optimal AV delay.

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23. – 52. (Cancelled)